Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG4D3
Module Title	Mechanical Engineering
Level	4
Credit value	20
Faculty	FACE
HECoS Code	100190
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
FdEng Industrial Engineering (Mechanical) FdEng Industrial Engineering (Electrical) BEng (Hons) Mechanical Engineering with Manufacture BEng (Hons) Electrical Engineering with Manufacture BEng (Hons) Sustainable Energy Engineering	Core

Breakdown of module hours

Learning and teaching hours	18 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	18 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**36 hrs**
Placement hours	0 hrs
Guided independent study hours	164 hrs
Module duration (Total hours)	**200 hrs**

Module aims

This module combines conceptual teaching with guided practical work to strengthen students' understanding of fundamental principles. Learners explore how theoretical knowledge connects with real-world practice through structured experimentation and applied tasks. The approach

builds confidence, technical awareness, and the ability to apply knowledge effectively within authentic learning contexts.

The aim of this module is to develop an understanding of key mechanical engineering principles in statics and dynamic systems and in fluid dynamics.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Use the principles of equilibrium to analyse static force systems and develop the concepts of stress and strain (axial, torsional, flexural) to simple engineering problems
2	Select and implement fluid mechanical and thermodynamics theories in practical applications
3	Apply the principles of work, energy, power and dynamics to the solution of engineering problems.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment 1: Portfolio

A portfolio of assessment will be developed that cover the learning outcomes, to include quizzes and laboratory reports demonstrating the understanding of key concepts within mechanical engineering.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Portfolio	2000	100	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark 40% has been achieved, with a minimum mark of 30% in each assessment element.

Learning and Teaching Strategies

Learning and teaching combine classroom-based instruction with structured laboratory practice to reinforce theoretical understanding through application. Students participate in lectures, workshops, and supervised experiments that link principles to professional practice. Online materials and activities complement face-to-face sessions, supporting reflection and self-paced learning. Tutorials and group discussions promote collaboration and the development of analytical and communication skills.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate. To further promote bilingual learning, all students have the opportunity to take the 20-credit *Welsh for STEM* short course, designed to develop confidence and subject-specific language skills in both English and Welsh.

Indicative Syllabus Outline

- Forces in Two Dimensions:
  Analysis of coplanar force systems, free-body diagrams, equilibrium of particles and rigid bodies, turning moments, forces acting at a point, and simple frameworks.
- Simply Loaded Beams and Structures:
  Shear force and bending moment concepts, axial stress and strain, torsion, stiffness, and flexural behaviour in simple engineering components.
- Fluid Mechanics:
  Fundamental fluid properties, fluid statics, flow behaviour, and application of Bernoulli's theorem to simple engineering systems.
- Thermodynamics:
  Principles of heat transfer, thermal expansion, energy systems, and evaluation of thermal effects in practical engineering applications.
- Dynamics:
  Linear and angular motion, kinematics and kinetics of particles, centripetal acceleration, and the application of Newton's laws to engineering problems.
- Work, Energy, and Power:
  Work–energy relationships, conservation of energy, mechanical power, and efficiency in engineering systems.

Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads:

J. Bird and C. Ross, Mechanical Engineering Principles, 4th ed. Routledge, 2019.

Other indicative reading:

R. C. Hibbeler and K. B. Yap, Engineering Mechanics: Statics, 14th ed. Hoboken: Pearson, 2016.

W. Bolton, Mechanical Science, 3rd ed. Oxford: Blackwell Publishing, 2006.

Administrative Information

For office use only	
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